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Rural emptiness and its influence on subsistence farming in contemporary Gabon: A case study in Loango National Park.

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Abstract

In sub-Saharan Africa, rural exodus leads to increasing unemployment in urban centres and to the disorganisation of farming practice in rural areas. This article draws on data from participant observation and interviews to analyse how rural exodus, combined with a population density that was already low, led to what we refer to as rural emptiness in Gabon, and how this affects farmers' livelihoods. Farming in Gabon is largely slash and burn agriculture with a gender division of labour and therefore requires both men and women. Farming practices at our study site, in Loango National Park, follow a traditional pattern, but the labour force has been reshaped by demographic and social change. The exodus of young people, especially men, has left ageing farmers with increased workloads but decreased access to labour. Subsistence farming is, therefore, in a state of crisis and farmers' livelihoods are threatened. Promoting the development of farming and rendering rural life more appealing through the development of roads and other infrastructure could reverse current trends of high unemployment, weakened agricultural production and high dependence on imported food in Gabon.

Introduction

Rural exodus, or outmigration, has been of particular interest in migration and development studies in sub-Saharan Africa, largely because of its influence on uncontrolled urbanization and increased rates of urban unemployment (Beauchemin & Bocquier 2003;

Bryceson 1999, 2002; Mabogunje 1989; Tacoli 2002; Todaro 1971, 1997). The literature reveals that movement to urban centres in Africa is opportunistic, is used to diversify livelihood strategies within the extended family and can be temporary (Beauchemin & Bocquier 2003; Bryceson 2002; Byerlee 1974; Potts 2009; Tacoli 2002). Movement to urban centres can alleviate poverty and

decrease mortality for migrants through better access to amenities and health care, and higher incomes compared to these of rural areas (Beauchemin & Bocquier 2003; Wunder 2003; Pourtier 1989b). However, the consequences of rural exodus can vary greatly among regions and among countries. For example, rural population densities remain large in West Africa despite rural exodus (Beauchemin & Bocquier 2003), but the exodus has contributed to decreasing rural densities in Central Africa (Sautter 1966; Coquery-Vidrovitch 1972; Pourtier 1989a), creating what we refer to here as 'rural emptiness'. In Central Africa, rural exodus has induced a loss of labour in rural areas, the ageing and impoverishment of farming communities and the disintegration of traditional farming practices (Sautter 1966; Coquery-Vidrovitch 1972; Pourtier 1989a). Rural exodus, hence, has the potential to weaken agricultural production, sometimes even resulting in famine (Pourtier 1989a; Beauchemin & Bocquier 2003; Wunder 2003).

In this study we investigate the factors contributing to low agricultural production in Gabon, which is located in the Central African region, with a focus on whether and how demographic trends of rural emptiness affect farmer livelihoods today. We begin by introducing the historical context of demographic trends in Central Africa, then present the state of knowledge of demography and farming in Gabon. Having set the scene, we present our methods and describe the socio-economic characteristics of the population and current farming practices at our study site. Then, we present the patterns of rural emptiness at the study site before analysing how rural

emptiness affects farmers' productivity and livelihoods. We end with conclusions and recommendations.

The Historical Demographic Context of the Central African region

Several authors have remarked on the low population density in Central Africa, offering a suite of biological explanations (refs). Headrick (1990) suggested that the low population densities and fertility in Central Africa may be due to the prevalence of endemic diseases (e.g., sleeping sickness and malaria, which may increase the rate of miscarriage), poor diet, and unbalanced sex ratios. These vulnerabilities have been exacerbated by colonial and post-colonial spread of venereal and other diseases (Sautter 1966; Headrick 1990; Coquery-Vidrovitch 1972; Adams & McShane 1996). Additionally, Sautter (1966) suggests that the dense forest habitat that characterizes Central Africa does not favour in-migration and sustainable social relationships between groups, thus limiting rapid population growth by constraining the number of potential partners thus leading to increased consanguinity and decreased fertility.

Contemporary low human densities, especially in rural areas, are also the result of historical forced displacement imposed on people in Central Africa countries since the 1700s. For example, Oslisly et al. (2013) suggest that the prolonged slave trade affected demographic patterns as well as ecosystems in the region. In Gabon, possibly as many as 18,000 individuals were lost to slavery each year in the second half of the 17th century (Gauthier 1950 cited in Bouet 1978), further depleting areas that already had

low population densities (Sautter 1966; Coquery-Vidrovitch 1972; Pourtier 1989a). Later, the French colonial administration's active regroupement scheme involved relocating villages alongside roads and other transport routes (e.g., rivers) in its colonies, emptying forests of human settlements (Pourtier 1989a). The regroupement policy was ostensibly aimed at providing populations with access to education and healthcare but also served as an instrument of control and facilitated the collection of taxes (Sautter 1966; Coquery-Vidrovitch 1972; Pourtier 1989a). Forced labour for concessionary companies or large infrastructure projects (e.g., railroad construction) concentrated elements of the labour force, particularly young men, in some areas, depleting other areas of their labour force (Coquery-Vidrovitch 1972; Pourtier 1989a; Adams & McShane 1996; Wunder 2003). Companies eventually realised that women farmers could produce a cheap source of food for their employees and started to accommodate entire families, sometimes creating schools and supporting farming on-site, concentrating populations even further (Coquery-Vidrovitch 1972; Pourtier 1989b). When displacement was not directly forced on people, they also moved away from their home villages to avoid forced labour, forced resettlement and taxation by the colonial state (e.g., Equatorial French Africa now Gabon, Republic of Congo, Central African Republic and Tchad : Coquery-Vidrovitch 1972).

Starting in the late 19Th century, rural exodus developed with the search for wage-earning activities in the proto-capitalist economy that was emerging more generally in sub-Saharan Africa

(Bryson 1981; Mabogunje, 1989). The low-income return of subsistence agriculture, combined with high differences in incomes between rural and urban areas, led subsistence farmers to seek alternative livelihoods in cities (Mabogunje 1989; Pourtier 1989; Smit 1998; Tacoli 2002). After some exposure to urban lifestyles, rural exodus is exacerbated by rural dwellers' desire to increase their quality of life and benefit from infrastructure such as schools, electricity and healthcare, which is present in urban centres but absent from isolated villages (Pourtier 1989b). The United Nations estimated that the annual global population growth rate in Gabon was 1.9 % in 2011 while the rural population growth rate was -0.4 %, which suggests that rural exodus was still occurring then (United Nation data 2011).

Demography and farming in Gabon

Populations appear to have always been low in Gabon. Archaeological records suggest that population densities were as low as 0.5 inhabitants per km² prior to colonisation by France (Clist 1995 referring to the Iron Age and cited in Wunder 2003). More recently, the population density was 1.68 inhabitants per km² in 1961 (Sautter 1966), and 5.7 inhabitants per km² in 2011 (United Nations data 2011). Although larger than in the 1960s, this latter value is still low in comparison to other countries in the region (Republic of Congo: 12.4 inhabitants per km²; Democratic Republic of Congo: 28.2 inhabitants per km²; Equatorial Guinea: 25.5 inhabitants per km² and Cameroun: 44.8 inhabitants per km²— World Bank data 2011). In addition, only 13.5 % of the total

population of Gabon lived in rural areas in 2011, with rural population densities sometimes as low as 0.2 inhabitants per km² (Wunder 2003; Laurance et al. 2006; United Nation data 2011).

Several authors suggest that the low human density is a cause of low food production in Gabon (e.g. Pourtier 1989a; Wunder 2003). Agriculture currently represents 3.9 % of the GDP and cultivated land represent less than 2 % of the country's surface area (World Bank Data 2011 and 2012). The importance of subsistence agriculture for rural populations in Gabon is unclear. Archaeological evidence suggests that slash and burn agriculture developed as early as 3500 – 2000 YBP in Gabon (Oslisly et al. 2013), suggesting that agriculture has long been a part of livelihood strategies. Metegue N'Nah (1979) mentioned that agriculture was the main activity providing non-protein food items in the pre-colonial era, and that gathering was used to supplement the diet, in addition to fishing or hunting. Gaulme (1981) considered that agriculture was the second most important resource for subsistence after forestry in Fernand Vaz, which is located on the coast of Gabon. In the specific case of coastal populations, it is argued that early contact with Europeans transformed local societies deeply and that people shifted their focus from manual labour and agricultural production to trade (Merlet 1990; Pourtier 1989a; Magnagna Nguema 2005). Wunder (2003, p 6), however, argues that all Gabonese farmers should be considered as “forest people practising complementary subsistence cropping”, suggesting a more important role for hunting and gathering than for agriculture. In both cases, food production remains low in part because

of low rural densities (Pourtier 1989a; Wunder 2003). For this reason Pourtier (1989a) considered that agriculture in Gabon was in a “state of crisis”.

To make matters worse, the Gabonese government provided very limited support for the development of agriculture until the mid-1980s, focusing instead on high return industries like forestry, oil exploitation and mining (Bouet 1984; Magnagna Nguema 2005). As a consequence, while the country was mostly self-sufficient until it gained independence in 1960, as much as 80 % of food items are now imported (Wunder 2003; FAO/CEEAC 2011). An FAO report cited by Tébeka (2012) estimates that Gabon spends close to 220 million euros annually to import fruit and vegetables from Cameroon, Ivory Coast, South Africa and the European Union (Tékéba 2012). Achieving food self-sufficiency is now a priority in the Gabonese government agenda (Tékéba 2012; Le Gabon 2013) and our study aims to contribute to this effort by providing insights into the processes currently affecting farmer's productivity and livelihood in Loango.

Study site and data collection

We collected data for this study as part of a study of the relationship between biodiversity conservation and farmers' livelihoods in the northern sector of Loango National Park (Loango NP Fig 1 and Fig 2.) from October 2009 to November 2010. We selected this region of Gabon as it is known to suffer a high level of conflict between wildlife and farmers (Lahm 1996). The regroupements included in the study are Ntchongorové, Idjembo, Ntchonimbani, Iloupi, Bonneterre, Obiro and Yombé (Fig 2). Together, Ntchonimbani, Iloupi,

Bonneterre, Obiro and Yombé are commonly referred to as “la Haute” (the upper lagoon), and we use this terminology throughout.

The population of Loango is composed of two major ethnic and linguistic groups: the Pounou (or Bapounou) and the Myéné (Blaney et al. 1999). While the Ngowé (also called Ngubi, and a segment of the Pounou group) seem to predominate, a large number of Nkomi people are present at the study site. Almost all people speak Nkomi (belonging to the Myéné language group) in addition to their natal language. The minority ethnicities present are Eshira, Loumbou (or Baloumbou), Bavarama and Vili of the Bapounou group, Bakota of the Batéké group, Nzebi, Benga, Fang, Akéle, Tsogo and Aduma (Blaney et al. 1999; ANPN 2009).

We combined participant observation with semi-structured group

interviews due to the difficulty of interviewing farmers individually (Emerson, Fretz, and Shaw 1995; Bernard 2005; Drury, Homewood, and Randall 2011). We selected farmers for interviews using stratified random sampling based on the location of their fields due to the need to survey crop-raiding incidents. We conducted 37 interviews with full-time farming families (Table 1). E.F. and K.R. lived in Ntchongorové and Idjembo for the duration of the study, resulting in first-hand experience of the difficulties that confront villagers living in remote areas of Gabon (e.g., poor transport infrastructure and lack of electricity and running water). This also allowed us to witness how rural emptiness affected peoples’ daily routines. We also mapped farmers’ fields with a GPS and calculated field size for each farmer using ArcGis 9.

TABLE 1.

Number of interviews conducted with farmers and proportion of farmers interviewed by regroupement

<i>Regroupement</i>	Number of interviews	% of farming families interviewed
Ntchongorové	11	31
Idjembo	10	58
Ntchonimbani	5	83
Iloupi	1	25
Bonneterre, Yombé, Obiro	10	91

FIGURE 1.

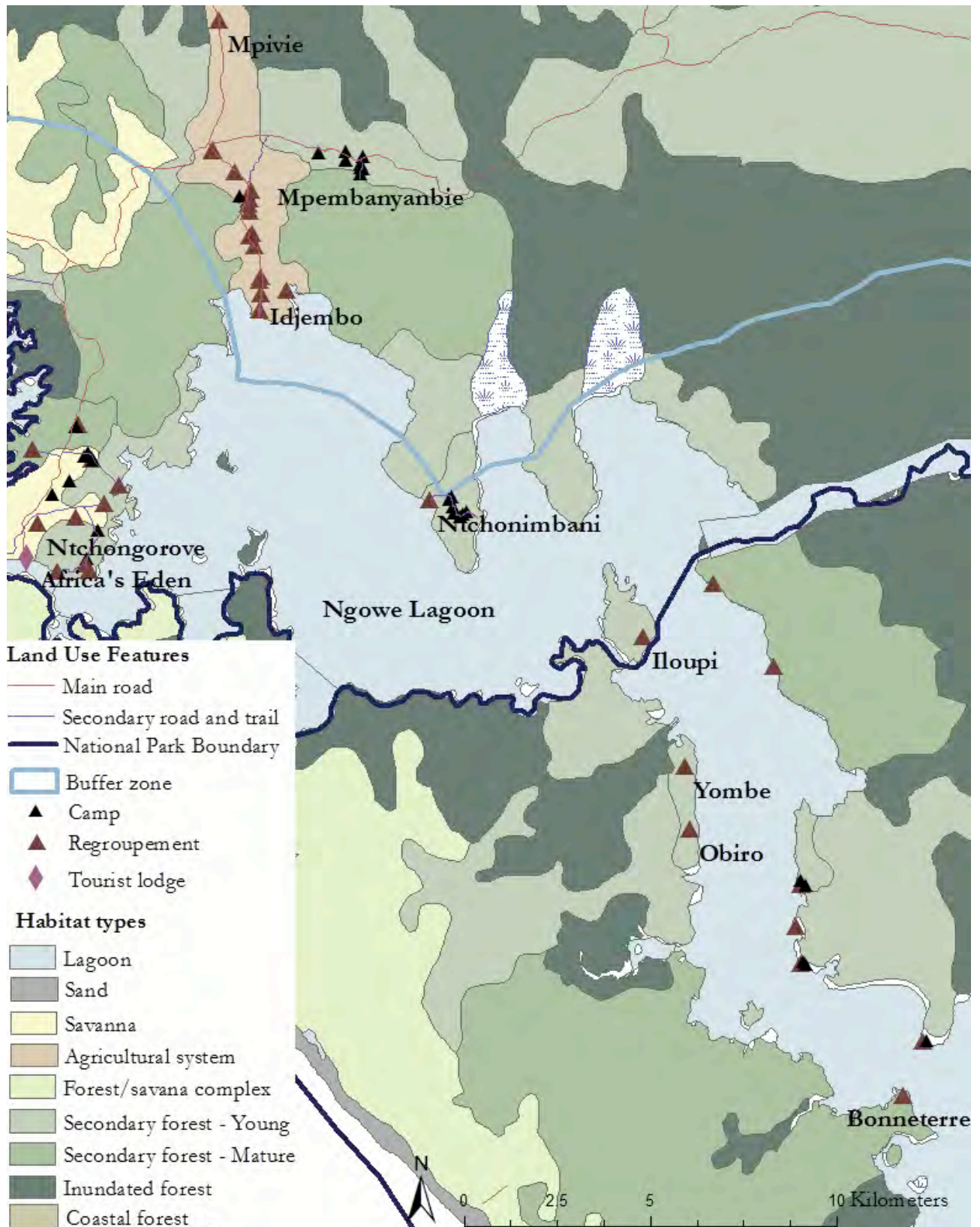
Map of Africa with Gabon in red, and a map of Gabon with National Parks in green. Loango National Park is framed in blue and red dots are the major cities of interest for this study. Map created based on data from the World Resources Institute.

Downloaded from <http://www.wri.org/publication/interactive-forestry-atlas-gabon> on 15th May 2012.



FIGURE 2.

Northern part of Loango National Park, including the study site which included all regroupements except Mpivié. Based on data provided by the Wildlife Conservation Society and observations in the field



Livelihood strategies and farming practices in Loango

As described earlier, Loango has long been under western influence which is believed to have shifted livelihood strategies from extraction and production of resources to trade with westerners (Metegue N'Nah 1979). Coastal people are known for acting as brokers between Europeans and groups from the interior during the slave-trade and also for trading ivory, wood and other forest products (Coquery-Vidrovitch 1972; Gaulme 1981; Pourtier 1989a). Since then, as in Gabon more generally, oil exploitation and forestry have provided a large source of income, keeping people away from subsistence activities (Pourtier 1989a; Wunder 2003).

Farmers in our study based their livelihood strategies on a portfolio of activities based around a gender division of labour. Sources of income included fishing, hunting, gathering, farming, traditional medicine, handicraft production and any wage labour activities available. Our data reveals that that 95 % of households in the park and Iloupi, 100 % in Idjembo and Ntchonimbani, and 35 % in Ntchongorové depend mostly on subsistence activities including farming. All households practising fishing, palm wine production, traditional medicine and handicraft production also farm. Women practise farming, traditional medicine, handicraft production and domestic activities, while men provide sources of protein through fishing and hunting or provide cash through wage labour. Sources of wage labour in the

area include tourism, conservation and research, oil exploitation, forestry, telecommunications, state employment for education, health and wildlife management, and operating transport, shops and bars. Other sources of income include remittances from relatives, pensions or the rental of properties. Households benefiting from wage labour engage in complementary subsistence or itinerant activities for food and/or as additional sources of income.

Farming or fishing was the primary source of income for 68 % of households in our study, although the proportion differed between villages (Table 2). Only 10 % of households reported farming as their sole source of income. Farmers never mentioned gathering as a livelihood strategy, and when gathering did occur it seemed to be limited to secondary food products such as crab, oysters, wild mango (odika), palm nuts (nyamboué) or raffia leaves for cooking manioc and in most cases these products were not sold but consumed within the household. People also mentioned collecting nuts (*Coula edulis* and *Cola* sp.) opportunistically when they were available near villages, although we never actually witnessed this. In general, gathering is practiced by women and is insufficient to provide food security or a substantial source of income in our study site. Households in la Haute relied more on fishing than farming while households in Ntchongorové relied more on other sources of income (Table 2). Information about money and income was often difficult to extract and, thus, we are aware that the information presented here is highly subject to

people's willingness to share such information.

Despite the ethnic diversity present, all people in our study used the same agricultural methods during the study period. Farming is limited to crop production with no livestock rearing apart from few chickens and, in two cases, a few goats. This lack of livestock production reflects a common trend throughout Gabon which may be the result of the predominance of hunting and gathering practices in the past and the historic prevalence of tsetse flies and trypanosomiasis, compounded by the inadequacy of transport and market systems which discourages investment in livestock farming (Magnagna Nguema 2005). Easy access to a productive fishery and the perceived threat of livestock depredation by pythons, leopards, and other wildlife exacerbate this trend in the specific case of Loango.

Contemporary farming in Loango has not advanced in the post-colonial era, as is the case more generally in Gabon (Pourtier 1989b; Wunder 2003), with most farmers still reliant on axes and machetes and virtually no mechanisation of labour. The shifting cultivation practice relies on a gender-based division of labour where men clear the forest to create new fields during the long dry season and women perform all other activities, from clearing brush and undergrowth, to planting, harvesting, selling and cooking produce (Pourtier 1989a; Leach 1992; Vansina 1990; Coomes et al. 2000). We only witnessed men engaging in all aspects of agriculture in Loango if they did not have a female partner or relative capable of farming.

Most farmers possess more than one field, including at least one from a

previous year that still provides food ("old field") and one cleared during the current year ("new field"). Fields are generally located less than 2 km from the village, but may be up to 8 km away. The mean field size at the study site is 5404 m²/woman/year (range 680 – 18,260 m²). Agricultural activities follow seasonal changes in rainfall where new fields are created during the long dry season (May-September).

Manioc (*Manihot esculenta*) is the predominant crop species and the most important for subsistence and income, though banana (*Musa* sp.), taro (*Colocasia esculenta*) and sweet potato (*Ipomoea batata*) are important secondary crops. Other crops grown include pumpkin (*Curcubita* sp.), aubergine (*Solanum* sp.), peanut (*Arachis hypogaea*), sugar cane (*Saccharum officinarum*), roselle (*Hibiscus sabdariffa*), chilli pepper (*Capsicum frutescens*), papaya (*Carica papaya*), pineapple (*Ananas comosus*), avocado (*Persea americana*), mango (*Mangifera indica*) and Citrus sp. (lemon, grapefruit, and orange). Manioc, banana and taro are grown over extended areas while the other crops are planted in small gardens around habitations. The root crops (manioc, potatoes and taro) are harvested as needed and can be left unharvested for extended periods (up to three years in the case of manioc). Bananas provide one bunch a year, which is harvested when ripe. Other, less important, food crop species are harvested when needed or ripe but, as they are not grown in large numbers or over extended areas, their harvest does not represent important activity for the farmers in the year.

TABLE 2.

Primary sources of income for interviewees in Loango

Primary source of income		Farming	Fishing	Other ¹	Traditional medicine
Regroupement	Number of households				
Ntchongorové	11	3	1	5	2
Idjembo	10	7	1	1	1
Ntchonimbani	5	3	2	0	0
Iloupi	1	0	1	0	0
Bonneterre, Yombe,	10	2	5	3	0
Total	37	15	10	9	3

¹ Includes wage labour, rental of properties, pensions and remittances from relatives

TABLE 3.

Monthly income of subsistence dwellers in Gabon

Publication	Date of study	Origin of income	Monthly income (CFA)
Blaney et al. (1999)	1998	Farming	30,000
Walker (2012)	2010	Hunting, fishing, irregular jobs and small pensions	10,000-45,000
Gabonese Statistical General Direction	2005	Annual income of the 20 % poorest in West Gabon (including the region of the study)*	22,600

*According to the United Nations, the lowest incomes in Gabon are for rural dwellers, women and widows (United Nation data 2011)

*Contemporary trends of rural emptiness in
Loango*

The current population density in
Loango is low and the last data available
provides a value of 0.2 inhabitants per

km² (Laurance et al. 2006). Records from the 1970s show that Idjembo, Ntchongorové and Yombé had about 580 inhabitants (Gaulme 1981) and Gaulme suggests that this value was low compared to earlier trends. Data collected in 1998 (Blaney et al. 1999) shows a population of 189 for these villages and of about 260 individual for the entire study site. Data from 2008-2010, including our data and ANPN (2009), shows a population of about 400 people for the entire study site. Population changes have differed between villages. For example the population in Ntchongorové has increased since 1998 (from 48 individuals to 254 including children) while the population has declined or remained stable everywhere else (e.g., from 102 to 52 in Idjembo, from 39 to 12 in Yombé and stable in Obiro and Ntchonimbani). Blaney et al. (1999) suggest that the historical presence of a school in Idjembo has helped to keep women and children in the area and we believe the creation of a school in Ntchongorové in 2008 had a similar effect. Employment in tourism in Ntchongorové and in oil and forestry companies has also slowed rural exodus at the regional level (Blaney et al. 1999). However, the population at the study site is now about a third smaller than it was in the 1970s.

The decline in population in Loango, which is partly due to rural exodus by young people, has resulted in a rapid increase of the average age of the remaining population (Blaney et al. 1999). Blaney et al. (1999) estimated that 33 % of the population in the Etimboué department (of which Loango is a part), including children under 14 yrs, was over 55 yrs, with 50 – 100 % of residents in

many villagers older than 55 years. Their data for the villages included in our study shows a value of 36.5 % of people over 55 yrs. Data provided by ANPN (2009) for the regroupements included in our study show that people over 55 yrs represent 18.5 % of the population if we include children under 14 yrs and 28.6 % if we exclude them. Our census in la Haute, however, showed far fewer children and adults under 55 yrs than the data provided by ANPN. In our study, 49 % of the subsistence farmers we interviewed (therefore excluding children) were over 50 yrs, with large differences in age structure between villages. Only 37.5 % of farmers were over 50 yrs in la Haute, compared to 64 % in Ntchongorové and 60 % in Idjembo. It is possible that village composition changed between 2008, when ANPN collected data, and our study in 2010. It is also possible that seasonality has played a role in the differences between the two datasets as family members and pupils tend to visit their relatives in villages during the dry season and holidays which may alter demographics at those times. In contrast to the exodus of young people, retired people tend to return to their home village to engage in subsistence activities either to complement their pensions or as a full-time subsistence strategy if they do not receive a pension. Six of the 37 farmers in our study came back to the study site at retirement after spending their working years in the city. The concomitant exodus of young and influx of elders increases the average age of the rural population.

Rural emptiness is partly caused by a lack of interest in the rural lifestyle and rural subsistence activities, including farming. Our discussions with people

under 35 yrs in the various villages clearly highlight that the hard work associated with farming and the difficulties of life in rural areas encourage them to remain in urban centres, even when unemployed. Young people only endure life in rural areas if they have access to wage labour or have no other choice. One older informant explained this situation as follows:

People today [meaning young people], they want to be in cities. They are everywhere but they don't work. They see that there is no ambience here [meaning other young people, bars and so on], so they don't want to stay. They don't like being in the village.

When we asked what they would do if they lost their jobs most people under 35 yrs replied that they would return to the nearest city to look for a new job. When we interviewed two young women working in tourism and with limited education, and asked whether they would stay in their village to engage in farming when unemployed, one said:

Oh Emilie, even when I go to see my mum, I refuse to work in the field. I don't even like life here [in rural areas], it is too harsh. I am here because I have a job, if not, I can't stay here.

Life in rural areas is generally very demanding, especially for women and children, as they are often in charge of most of the domestic duties in addition to non-protein food production (e.g., water fetching, collection of firewood, laundry, cooking). Several studies have shown that sub-Saharan African women work 45 to >73 hours a week for food

production and domestic labour alone (Laburthe-Tolra 1975 and Guyer 1977 cited in Bryson 1981). It is, therefore, likely that the high daily workload of women in rural areas makes a rural lifestyle unappealing to young women in comparison to life in cities, which decreases the burden of domestic duties through easy access to electricity and water, and access to wage labour opportunities. Both the young women questioned above lost their job at the study site in 2011, and both left for the nearest big city where they are still working today (May 2014).

Men seem to be more willing to remain in rural areas. We encountered eight men under 55 yrs (five were <35 yrs) who had lost their full-time job in tourism or conservation Idjembo and Ntchnogorové but remained in the area, at least temporarily, to engage in subsistence activities (e.g., fishing and palm wine production) or to benefit from temporary wage labour opportunities in oil industry. The high economic return of fishing and wage labour when compared to farming, in addition to the fact that men do not support the burden of domestic duties, makes life in rural areas more attractive to men and young men than to young women. The high proportion of people under the age of 50 yrs in la Haute, where there are no facilities, and where villages are very isolated, probably has a similar explanation. People in la Haute rely heavily on subsistence fishing, which is probably motivated by two factors: 1) a high level of crop-raiding, which discourages farming (see Fairet 2012 for details of crop-raiding), and 2) the high economic return from fishing which makes it a more attractive activity than ?.

In addition to an actual loss of people, rural exodus also fragments

villages (Sautter 1966). According to several authors, villages in Gabon were larger at the beginning of the century than they are now (Sautter 1966, Gaulme 1981; Blaney et al. 1999) and contemporary villages are often the result of village breakup following family disagreements. While family disagreements also occurred in the past, they were resolved more readily due to the need to stay grouped for safety reasons (Sautter 1966). Several elders in our study villages complained that young people no longer wish to remain in their natal villages due to family dissent and prefer to create a new village instead. Sometimes each sibling of the same nuclear family sometimes created a new village in Loango, fragmenting the family group. Their explanation was that remaining with their parents led to too many conflicts and that it was easier to be independent. In areas with limited transport infrastructure, such as Loango, such fragmentation has led to smaller, isolated villages that are scattered across the landscape. This situation is also reflected in the difference between Blaney et al.'s (1999) report of 3 villages and ANPN's (2009) report of 10 villages in la Haute. As a consequence of this fragmentation, people are more scattered and, therefore, more isolated from each other even when they remain in the same area.

By contrast to the picture of systematic exodus from rural areas and subsistence based activities by young people, we also found that several long-term unemployed young people had returned to their home village and engaged in subsistence activities (mostly fishing, but also farming), sometimes on a long-term basis. This implies that subsistence activities in rural areas

remain as a safety net or fallback strategy during times of duress, such as long-term unemployment, as shown more generally in Africa (e.g., Mabogunje 1989; Beauchemin & Bocquier 2003; Wunder 2003).

Consequences of rural emptiness for farmers

Agriculture has been deeply affected by rural emptiness in Loango (Gaulme 1981; Pourtier 1989b). The outmigration of young women has significant implications for farmers in terms of daily workload. Young female relatives, particularly daughters, previously provided substantial assistance to farmers in all activities from domestic duties to processing manioc (Bryson 1981; Fresco 1986; Vansina 1990; Cramb et al. 2009). This assistance allowed the farmers to spend more time in their field, as well as providing a buffer against heavy workloads, both in the house and in the field. With younger female relatives away at school, living in urban centres, earning a wage or simply unwilling to help, female farmers now face an onerous daily workload alone.

Agriculture has also suffered a direct loss of access to male labour, which is needed to clear fields. According to our informants, male relatives did this work in the past but this is not always the case now. One of our informants explained this as follows:

As I am now, I have cleared this little garden that monkeys and cane rats have eaten. [...]. Before, you didn't need to pay people to clear your field [suggesting there were people to do it without providing cash] but now you need money and

alcohol for someone to clear your field.

The lack of access to men can be a simple consequence of the ageing of the population, especially in the farming community, leading to husbands who do not have the strength or the or the ability to clear fields for their wives or relatives. Nine of the 36 farmers included in the study (24 %) had husbands who were too old or disabled to clear fields for their wives or relatives. Another five women were widowed or simply did not have a husband or partner to help them.

Traditionally, children of the family clear fields for their female relatives but this did not occur frequently in our study. Of the 14 women farmers who had no partner to help, seven (50 %) had no sons present in the area who could clear their field for them. Another five (36 %) had sons present in the area who were working for tourism or conservation full-time and did not clear their relatives' field. The last two farmers had sons in the area and we do not know why the sons did not help them.

The direct consequence of the lack of male relatives available to help farmers is the need to find extra-familial sources of labour. One informant, whom we estimated to be more than 70 yrs, explained that she was obliged to work in other farmers' fields to earn money to pay men to clear her own field because her husband was too old to do it himself and no other relatives were available to help without payment in cash. However, most farmers said that their working children tried to send money to help pay for labour to cut and clear fields. When we asked how one

informant how she managed to have a field cleared she answered:

If my children are available they come and do it [cut and clear the field]. If not they send money to hire somebody. This year there is no money so I am waiting to see whether my kids are going to come.

Our interviews revealed that the cost of clearing a field of big trees averaged 20,000 - 50,000 francs CFA (equivalent to US\$ 41 – 103) plus the provision of food and drink to the labourers. This is in line with Walker's (2010) study on crop-raiding in Gabon in general, which gives an estimate of 52,000 CFA (about US\$ 100) to clear an average field at our study site (9.7 CFA / m² for an average field of 5,404 m²). The additional cost of hiring labour to clear the field from smaller shrubs and liana averages 30,000 CFA (US\$ 60) based on our data and 60,000 CFA based on Walker's (2010) estimations. In total, it would cost farmers 50,000 – 112,000 CFA to prepare a field for planting. We did not collect data on annual income but the literature allows us to estimate incomes for rural dwellers at 22,000 – 75,000 CFA per month (30,000 CFA from farming + 45,000 CFA from other sources maximum - Table 3). Thus, hiring labour to clear a field costs the equivalent of 1.5 – 5 month's income for families relying primarily on farming as a source of income and about 0.7 – 1.5 month's income for families relying on a portfolio of subsistence activities. The cost of hiring the labour necessary to farm requires a non-negligible and reliable source of income if relatives cannot help.

Farmers use two main options when they cannot afford external labour and cannot manage the extra labour required to clear new fields. First, they farm smaller fields, as also recorded by Pourtier (1989a) and Wunder (2003), and, consequently, experience lower production. Lower production adds to farmers' risk of poverty because they cannot secure their income from farm produce and must purchase essentials that they might otherwise have produced. Subsistence agriculture in Gabon produces only 5 – 15 % surplus, which farmers generally use as an additional source of income (Mengho 1978 and Wilkie and Sidle 1990, cited in Lahm 1993). If production falls, this will lead to a direct lack of food or lack of income.

The other possible solution is to replant on young fallows that do not yet have big trees and are easily cleared with a machete. Young fallows also tend to be closer to the village, reducing the need to travel long distances daily. Several of our informants over the age of 60 yrs explained that the associated waning strength and poor health associated with age and a lack of relatives to help resulted in smaller field sizes and/or use of young fallows. For example:

I have cleared a little garden here near my old garden [which was a place where she used to have a field only few years ago]. I wanted to clear a field in Mpembanyanbiè [far from her home but where other farmers had cleared fields that year] but my children said I was too old to go far and that I should stay near the village. Also if I clear a large field, who is going to help me? I can't. I have to make this little garden.

Fields created on younger fallows tend to have a higher incidence of weeds (Fresco 1986; Walker 2010), which increases labour requirements further. Most farmers at the study site complained about the intensity of weeding requirements but we never witnessed a farmer paying for extra-familial labour to weed their field. During the study, however, six farmers in Ntchongorové and Idjembo abandoned a portion of their field because they could not weed it properly. In addition, young fallows may not necessarily have benefitted from good soil regeneration, suggesting that crop production will be lower for a similar workload (Fresco 1986; Cramb et al. 2009). Thus, farmers need to increase the field size to achieve similar levels of production to fields cleared from mature forest. Again, this lead to heavier workloads for planting and weeding, which may simply not be possible when relatives are already not available to help.

Another consequence of the lack of available male labour is a transfer of gender roles, increasing farmers' workload even further. In Loango, a meal without protein is not considered a "proper" meal and is associated with the French word *disette*, which means famine and food scarcity, and is extended locally to mean poor nourishment due to the lack of protein. Men are generally expected to provide animal protein (e.g., fish or meat) in Loango, or the financial means to purchase it. Historically, women fished for oysters and crab or fished with a simple line, but they did not fish with a net (Gaulme 1981). During the course of this study, we rarely witnessed women fishing for oysters or crabs. Five women fished with a net in la Haute but they all

accompanied their husbands when they did so. In addition, two women in la Haute and two women in Ntchongorové were obliged to fish, in addition to farming and performing other domestic activities, because they had no men to fish for them. The other villagers recognized these women as “very strong women,” supporting the notion of a gender bias in fishing strategies. Women not capable of taking on the additional burden of fishing with a net by themselves risk reduced access to protein and a subsequent cascade of social and familial effects. Similar gender role transfer has been observed in other parts of Gabon (Metegue N’Nah 1979; Pourtier 1989b) and imposes significant time and financial constraints on women’s lives.

One important activity often overlooked in studies of labour constraints on subsistence farming is the need to protect fields against crop-raiding animals. At our study site, field protection, including fence building, trapping and night-guarding, is the duty of young people and men. Where these demographic groups are absent, women, elderly men and children have to protect their fields against raiders like elephants, but are often unable to do so. In addition to the increased workload for women, their reduced capacity to protect the fields adequately leads to increased crop loss (Lahm 1996; Fairet, 2012). The combined responsibilities of domestic duties, farming (including the protection of crops), and fishing are overwhelming in the absence of an available labour force, which ultimately creates a labour bottleneck and results in the farmers’ inability to secure sufficient food and income.

At the same time as food production becomes increasingly

difficult, and often as a direct consequence of farmer’s inability to produce enough food to sell, the price of a manioc “packet” increased by 25 % locally (from 4,000 to 5,000 CFA) between 2010 and 2012. Farmers blame this rise on the cost of labour. One informant expressed this as follows:

Food purchase is difficult now. See the price of the packet is 5,000 CFA now. Well when you need to take somebody to help you it makes the price increase of course.

EF still lives at the study site and manioc is increasingly difficult to purchase locally. She is now obliged, on occasion, to have manioc sent from Port-Gentil or Libreville (two large cities). The reason women at the study site provide for not selling manioc is the difficulty of farming and the high workload required. Manioc that is sold in villages for 5,000-6,000 CFA can be sold for 6,000-10,000 CFA in Port-Gentil. The higher price in cities is partly due to the added cost of transport from rural to urban centres but also to the high demand for food in urban centres. This difference in price leads some farmers to send their produce to the nearest city rather than selling it locally. The direct consequence is a further lower availability of food in villages and further price increases in both rural and urban areas.

Farmers also send food to their urban relatives on a regular basis, especially students and unemployed family members. However, the lack of access to labour means that they are now unable to produce enough food to do so. This represents the loss of a possible food safety net for urban dwellers, and especially students. Thus, while the lack of access to labour seems to affect

mostly rural dwellers, rural emptiness has also a negative influence on urban dwellers.

Conclusion and recommendations

Rural emptiness, combined with a lack of interest in farming by young people, have intensified the labour and income requirements placed on individual farmers in Loango. Ultimately, this perpetuates a negative feedback cycle whereby labour shortages inflate labour demands and costs, as previously suggested by Wunder (2003) for Gabon. This constrains farmer productivity, eliminating the surplus food necessary to render villagers resilient to food and economic insecurity. The most vulnerable citizens (elderly people, husbandless women and poorer households) are overrepresented in rural areas and are the most severely affected by these societal changes, partly due to their inability to mitigate crisis (United Nations 1995). In this context, the unreliable and limited labour force exacerbates the effects of any event that affects a farmer's abilities to plant and harvest, and can lead to a subsistence crisis (Scott 1976). Subsistence farming practices remain traditional, while the labour force on which they were founded has been reshaped by demographic and social changes. The farming system in Loango is, therefore, still in a "state of crisis" – as observed by Pourtier (1989a) nearly 25 years ago.

Under its current sustainable development strategy, the Gabonese government aims to decrease dependency on extractive resources, such as petroleum and timber, and improve food production (Bouet 1984;

Le Gabon 2013). The national implications of the failing farming system may be severe as Gabon strives to reach the national objective of food self-sufficiency. Without the combination of organized intensive/commercial and subsistence local agriculture, food prices will continue to rise in both rural and urban areas and reliance on imported, and often expensive, products will only amplify (Wunder 2003). Poorer households, many of whom rely on farming for subsistence, are already struggling to produce enough food or income, resulting in as much as 70 % of the Gabonese population feeling undernourished (Gallup Inc. 2012) and 33 % of the population and 44 % of the rural population living under the national poverty level (World Bank data 2011). Promoting and facilitating local food production and trade would not only reverse this issue, but would also help reduce Gabon's high unemployment (United Nation data 2011), especially among young people, who might be more willing to engage in farming if it was more profitable, as suggested by the example of profitable fishing practices at our study site. Trends in Gabon, and other sub-Saharan African countries (Beauchemin 2002), suggest that re-ruralisation may be occurring, and even increasing, in some places (rural population growth in Gabon was 0.19 and 0.13 for 2011 and 2012, respectively, World Bank data 2012). EF recently encountered a young woman who had abandoned her wage job in Port-Gentil to return to her village to start farming as a direct result of the increase in the price of manioc to 10,000 CFA. This example is encouraging as it shows that young people may consider lives in rural

areas as an opportunity to prosper rather than simply to survive.

As proposed by others, developing rural facilities and infrastructures to improve living conditions, as well as developing reliable transportation routes to facilitate easy transfer of labour and products between rural and urban areas, could incentivize a reversal to rural exodus (Tacoli 2002; Todaro 1971, 1997). While industrial farming is undoubtedly on the government agenda (Le Gabon 2013), subsistence farming should not be neglected as a force keeping local and national price to reasonable levels as discussed by Baiphethi & Jacobs (2009). Improving and promoting local, small-scale food production in Gabon could therefore boost the nutritional and economic security of its populations.

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